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SPECIFICATION FOR MOORING BUOY SHACKLES

(First Reprint APRIL 1987)

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

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SPECIFICATION FOR MOORING BUOY SHACKLES

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Indian Standard

SPECIFICATION FOR MOORING BUOY SHACKLES

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 18 June 1968, after the draft finalized by the Shipbuilding Sectional Committee had been approved by the Mechanical Engineering Division Council.

0.2 Buoy shackles are one of the attachments used with anchor chains for mooring the ships to mooring buoys.

0.3 In the preparation of this standard, considerable assistance has been derived from the following:

JIS F 3306-1958 Buoy shackles. Japanese Industrial Standard Committee.

Lloyd's Register of Shipping 1966.

0.4 This standard is one of the series of Indian Standards on electrically welded anchor chains and accessories. The other standards in this series are:

IS : 4484-1967 Specification for electrically welded stud link anchor chains and attachments

IS : 4692-1968 Specification for electrically welded studless link anchor chains and attachments

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard lays down the specification for forged mooring buoy shackles.

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*Rules for rounding off numerical values (*revised*).

2. TERMINOLOGY

2.0 For the purpose of this standard, the following definitions shall apply.

2.1 Mooring Buoy Shackle — This is the shackle used in connecting anchor chains to the mooring buoys.

2.2 Nominal Size — Nominal size of the mooring buoy shackle is the actual diameter of the anchor chains with which the shackle is to be used.

3. MATERIAL

3.1 Mooring buoy shackles shall be made of materials given below:

*Designation of Steel**	*Tensile Strength in kgf/mm²*	*Minimum Percentage Elongation†*	*Maximum Radius for Bend Test*
C25	44 to 54	23	1·5 d‡
C40	58 to 68	18	1·5 d

3.1.1 *Tensile Test* — The tensile test shall be carried out in accordance with IS : 1608-1960§. A specimen for tensile test shall be either the full section as rolled or shall be machined to a convenient size provided the area of the reduced portion is not less than 161 mm².

3.1.2 *Bend Test* — Bend test shall be carried out in accordance with IS : 1599-1960‖. The specimen shall be either full section as rolled or shall be machined to a diameter not less than 25 mm or rectangular cross-section of 25 × 19 mm. Each test piece shall withstand, without fracture, cold bending through an angle of 180° over a former with a maximum radius as shown in **3.1**.

4. DESCRIPTION AND PROCESS OF MANUFACTURE

4.1 The mooring buoy shackle consists of:

a) body, with an eye to support pin when not in place,

b) shackle pin with eye,

c) cotter to fix the pin place, and

d) shackle for retaining the cotter in place.

---

[*] *See* IS : 1570-1961 Schedules for wrought steel for general engineering purposes

[†] On a length of $5{\cdot}65\sqrt{A}$ where A = sectional area of test piece.

[‡] d = Diameter of test piece.

[§] Method for tensile testing of steel products other than sheet, strip, wire and tube.

[‖] Method for bend test for steel products other than sheet, strip, wire and tube.

A keep chain shall be used to support the pin, cotter and cotter shackle when not in use.

4.2 The mooring buoy shackles shall be of two types, namely, Type A and Type B.

4.2.1 *Type A* — In Type A, the two legs of the body are also connected by a strut. The strut may be welded provided the body together with the strut is annealed after welding. This type of shackle is connected to the common link of anchor chain with a kenter type joining shackle.

4.2.2 *Type B* — In Type B, the shackle is of bow type. This type of shackle is attached to the end link of anchor chain.

4.3 All parts of the mooring buoy shackle shall be forged.

4.3.1 However, the eye on body and pin may be welded, provided annealing is carried out after welding.

4.4 The pin shall be capable of being easily pushed in and out from either direction of the shackle.

5. SHAPE AND DIMENSIONS

5.1 The shape and dimensions of Type A and Type B mooring buoy shackles shall be as shown in Table 1.

5.2 The shape and dimensions of the cotter and the shackle for cotter shall be as shown in Table 2.

6. TOLERANCES

6.1 The tolerance on the hole for the body of the shackle shall be H8 in accordance with IS : 919-1963*.

6.2 The tolerance for the hole in the pin to receive cotter shall be H8 in accordance with IS : 919-1963*.

6.3 The tolerance on all other dimensions shall be according to the coarse series of IS : 2102-1962†.

7. TESTS

7.1 Breaking Test — Mooring buoy shackles shall be subjected to the breaking test loads specified in Table 3. The breaking load shall be applied to at least one shackle out of every 25 or less. The shackle so tested shall be destroyed and not used again.

---

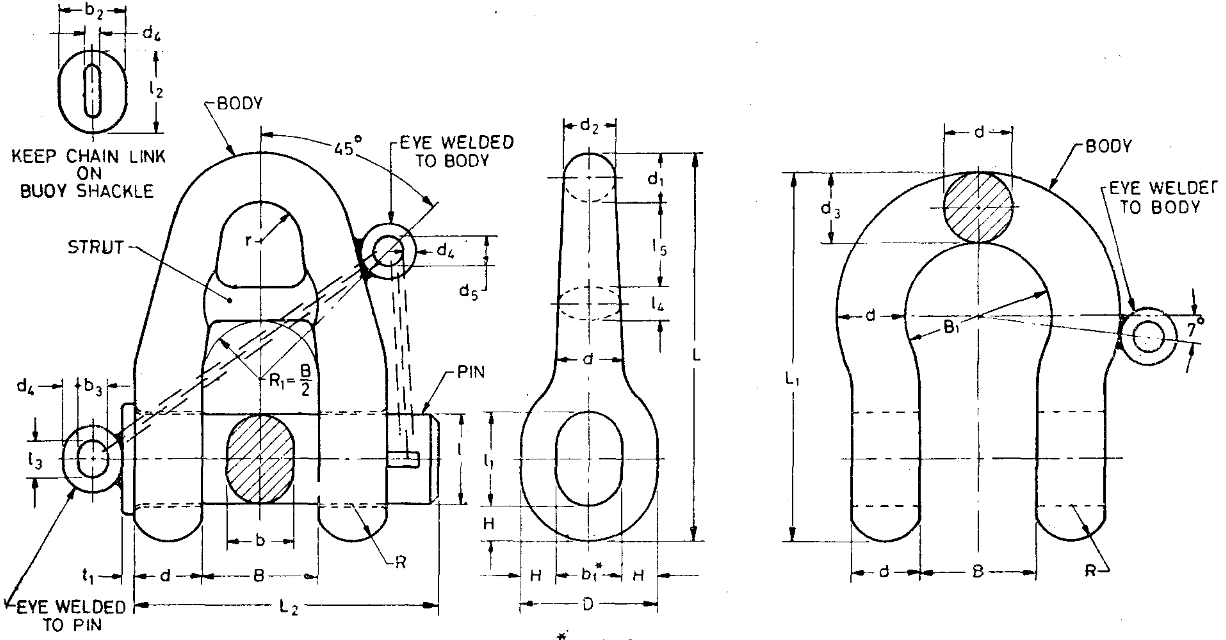
*Recommendation for limits and fits for engineering (*revised*).

†Recommendations for machining deviations for dimensions without specified tolerances.

TABLE 1 DIMENSIONS FOR TYPE A AND TYPE B MOORING BUOY SHACKLES

(*Clauses* 5.1 *and* 8.1, and *Fig.* 1)

All dimensions in millimetres.



$^*b_1 = b + 2$

TYPE A

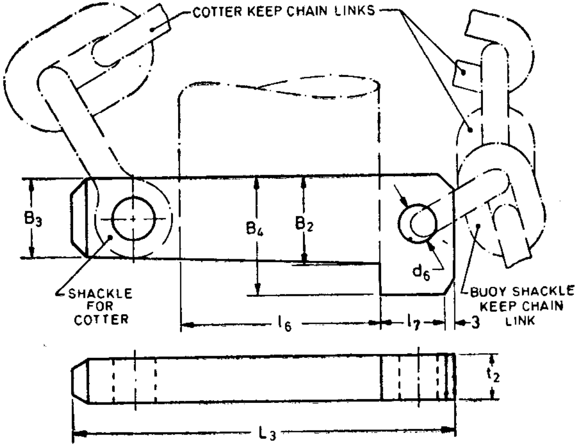
TYPE B

NOMINAL SIZE	d	d_1	d_2	d_3	d_4	d_5	D	B	B_1	b	b_2	b_3	H	L	L_1	L_2	l	l_1	l_2	l_3	l_4	l_5	R	r	t_1
37	34	37	41	56	17	34	110	160	200	52	83	34	28	412	387	313	78	80	118	51	28	66	30	31	16
40	58	40	44	60	17	34	118	160	200	56	83	34	30	425	400	322	84	86	118	51	29	72	32	34	16
43	62	43	47	64	17	34	126	160	200	60	83	34	32	437	412	332	90	92	118	51	30	77	34	37	16
46	68	46	51	69	17	34	134	160	200	64	83	34	34	450	425	342	97	99	118	51	32	83	37	39	16
48	70	48	53	72	17	34	141	160	200	67	83	34	36	461	436	351	101	103	118	51	34	86	38	41	16
50	72	50	55	75	17	34	148	160	200	70	83	34	38	472	447	356	105	107	118	51	35	90	40	42	16
53	77	53	58	80	17	34	156	160	200	74	83	34	40	484	459	365	111	113	118	51	37	95	42	45	16
56	81	56	62	84	17	34	164	160	200	78	83	34	42	496	471	379	115	117	118	51	39	100	45	48	16
58	84	58	64	87	19	38	171	180	225	81	93	38	44	531	496	414	117	120	124	57	41	104	46	49	18
61	88	61	67	92	19	38	179	180	225	85	93	38	46	549	514	425	119	122	124	57	42	110	49	52	18
63	91	63	69	94	19	38	186	180	225	88	93	38	48	556	521	432	121	124	124	57	44	113	50	54	18
66	96	66	73	99	19	38	194	180	225	92	93	38	50	576	541	446	127	130	124	57	46	119	53	56	18
71	103	71	78	106	19	38	207	180	225	99	93	38	53	594	559	462	136	139	124	57	50	128	57	70	18
73	106	73	80	110	21	42	214	180	225	102	101	42	55	604	569	470	140	143	124	57	51	132	58	62	18
76	110	76	84	114	21	42	222	200	250	106	101	42	57	646	601	498	146	149	128	63	53	137	61	65	20
78	113	78	86	117	21	42	227	200	250	109	101	42	58	656	611	506	150	153	128	63	55	140	62	66	20
81	117	81	89	122	21	42	237	200	250	113	101	42	61	669	624	518	155	158	128	63	56	142	65	69	22
83	120	83	91	124	23	46	242	200	250	116	115	46	62	677	632	527	159	163	128	63	56	145	66	71	22
85	123	85	94	127	23	46	249	200	250	119	115	46	64	687	642	534	163	167	144	69	59	153	68	72	22
87	126	87	96	130	23	46	254	200	250	122	115	46	65	702	657	545	167	171	144	69	61	156	70	74	22
92	133	92	101	138	23	46	269	200	250	129	115	46	69	713	668	557	177	181	144	69	65	164	73	77	22

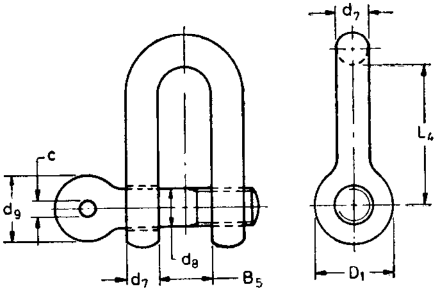
TABLE 2 DIMENSIONS FOR COTTER AND SHACKLES

(*Clause* 5.2)

All dimensions in millimetres.



COTTER



SHACKLE FOR COTTER

NOMINAL SIZE	COTTER								SHACKLE FOR COTTER						
	B_2	B_3	B_4	d_6	L_3	l_6	l_7	t_2	B_5	C	D_1	d_7	d_8	d_9	L_4
37	23	21	33	10	99	52	18	9	14	4	21	7	10	18	32
40	25	22	34	10	106	56	20	12	14	4	21	8	10	18	32
43	26	24	36	12	116	60	22	13	17	5	25	10	12	21	45
46	28	25	38	12	121	64	22	14	17	5	25	10	12	21	45
48	29	26	39	12	125	67	23	14	17	5	25	10	12	21	45
50	30	27	40	12	136	70	24	15	20	5	32	12	15	21	48
53	32	28	42	14	143	74	26	15	20	5	32	12	15	25	48
56	33	30	45	14	148	78	27	16	20	5	32	12	15	25	48
58	34	31	46	14	156	81	28	17	24	6	32	14	15	30	48
61	37	34	49	16	163	85	30	18	24	6	36	14	17	30	56
63	38	36	50	16	167	88	30	19	24	6	36	14	17	30	56
66	40	37	54	16	173	92	32	20	24	6	36	14	17	30	56
71	42	40	56	18	187	99	34	21	24	7	40	16	19	35	64
73	44	40	58	18	191	102	35	22	26	7	40	16	19	35	64
76	44	41	58	20	196	106	36	22	26	7	40	16	19	35	64
78	45	42	60	20	204	109	36	23	29	8	45	18	21	40	72
81	48	44	64	20	210	113	38	24	29	8	45	18	21	40	72
83	50	45	67	20	216	116	38	25	29	8	45	18	21	40	72
85	51	47	68	22	219	119	39	25	29	8	45	18	21	40	72
87	52	47	69	22	222	122	40	26	29	8	45	18	21	40	72
92	54	49	71	22	231	129	40	27	29	8	45	18	21	40	72

7.2 Proof Test — The mooring buoy shackles shall be subjected to the proof test load specified in Table 3.

TABLE 3 PROOF TEST LOAD AND BREAKING LOAD

(*Clauses* 7.1, 7.2 *and* 7.3)

Nominal Size	C25		C40	
	Proof Test Load kgf	Breaking Load kgf	Proof Test Load kgf	Breaking Load kgf
37	39 350	56 200	56 200	78 700
40	45 700	65 280	65 280	91 400
43	52 500	75 000	75 000	105 000
46	59 700	85 300	85 300	119 450
48	64 750	92 550	92 550	121 550
50	70 000	100 000	100 000	140 000
53	78 200	111 700	111 700	156 400
56	86 750	123 950	123 950	173 500
58	92 700	132 400	132 400	185 350
61	101 900	145 600	145 600	203 800
63	108 300	154 650	154 650	216 500
66	118 050	168 650	168 650	236 150
71	135 250	193 200	193 200	270 500
73	142 350	203 350	203 350	284 700
76	153 300	219 050	219 050	306 650
78	160 800	229 750	229 750	321 600
81	172 300	246 150	246 150	344 650
83	180 200	257 400	257 400	360 400
85	188 200	268 800	268 800	376 300
87	196 250	280 350	280 350	392 500
92	217 100	310 100	310 100	434 150

7.3 Mooring buoy shackles may be tested in conjunction with the chains. The shackles are accepted having passed the proof test if they are free from flaws, cracks and other defects after the application of the proof test loads given in Table 3 according to the grade of chain.

8. INSPECTION

8.1 The inspection of dimensions of the mooring buoy shackles shall be made after the completion of the proof test. The dimensions of the shackle shall conform to Table 1 and the tolerance shall conform to that given in 6.

9. DESIGNATION

9.1 The mooring buoy shackle shall be designated by the type, the nominal size, grade of steel and number of this standard.

Example:

A mooring buoy shackle Type A having a nominal size of 58 mm made from C40 steel shall be designated as:

Mooring Buoy Shackle A58 IS : 4990 —C40.

10. MARKING

10.1 Mooring buoy shackles shall be stamped on the body with manufacturer's mark, number and nominal size.

10.1.1 These may also be marked with the Standard Mark.

NOTE — The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act 1986 and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

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